U.S. Naval Medical Research Unit No. 3

The Naval Medical Research Unit No. 3 (NAMRU-3) is based in Cairo, Egypt. Its mission is to conduct infectious disease research, including the evaluation of vaccines, therapeutic agents, diagnostic assays and vector control measures, and to carry out public health activities aimed toward improved disease surveillance and outbreak response assistance. Our command plays a key role in enhancing the health, safety and readiness of U.S. DoD personnel assigned to Africa, the Middle East, and Southwest Asia on both peacetime and contingency missions.

NAMRU-3 works closely with the Egyptian Ministry of Health, the U.S. National Institutes of Health (NIH), the World Health Organization (WHO), the U.S. Agency for International Development (USAID) and the U.S. Centers for Disease Control and Prevention (CDC). NAMRU-3 has been a WHO Collaborating Center for HIV/AIDS since 1987. In 1999, a U.S. DoD Global Emerging Infections System (GEIS) program was established which led to expansion of NAMRU-3 public health activities and capacity building in host countries. This in turn led to the recognition of NAMRU-3 as a WHO Collaborating Center for Emerging and Re-Emerging Infectious Diseases in 2001. NAMRU-3 also serves as a WHO reference laboratory for influenza/H5 and meningitis in the Eastern Mediterranean Region (EMRO).

NAMRU-3 has modern research laboratories and a medical library. NAMRU-3 is one of only two research institutions in North Africa with a functional Biosafety Level (BSL-3) laboratory, and the only research institution in the region with an Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC) accredited animal facility. All human and animal research conducted at this facility is subject to approval by the NAMRU-3 Institutional Review Board (IRB) and/or the Institutional Animal Care and Use Committee (IACUC).

Research partnerships have been established in numerous other countries, to include Yemen, Saudi Arabia, Oman, Liberia, Uganda, Djibouti, Jordan, Gabon, Côte d'Ivoire, Burkina Faso, Togo, Bulgaria, and the Republics of Ukraine, and Kazakhstan. The NAMRU-3 Ghana Detachment, established in 2001, builds upon long-standing collaborations with the Ghanaian Ministry of Health and the Noguchi Institute on malaria research trials. NAMRU-3 plays an important role in the global response to the threat of avian influenza and pandemic influenza and is currently active in monitoring infectious disease trends among both civilian and military populations in the Middle East and Africa. Since 2009, NAMRU-3 has conducted 21 disease outbreak investigations in 14 different countries.

History of NAMRU-3 -- 1942 to Present

NAMRU-3 is the largest overseas military medical research facility and one of the largest medical research laboratories in the North Africa-Middle East region. The laboratory traces its origins to 1942, when American scientists and technicians began working with Egyptian physicians at the Abbassia Fever Hospital, Cairo, Egypt, under the auspices of the United States Typhus Commission established by President Franklin D. Roosevelt. Following World War II, the Egyptian Government invited the U. S. Navy to continue collaborative studies of endemic tropical and subtropical diseases with Egyptian scientists. NAMRU-3 was formally established in 1946, and the laboratory has been in continuous operation despite periods of political tension and a seven-year lapse in U.S.-Egyptian relations (1967-1973).

NAMRU-3 Research Programs

The research programs at NAMRU-3 are closely integrated to maximize use of scarce research dollars. NAMRU-3 continues to compete favorably among the eight DoD infectious disease laboratories, reflecting the high level of research and unique opportunities available to research scientists at NAMRU-3.

Bacterial and Parasitic Disease Research Program (BPDRP)

"To describe the epidemiology of enteric pathogens in the region and evaluate vaccines, therapeutic agents and diagnostic assays."

The mission of BPDRP has focused on research, epidemiology, and surveillance of enteric and other pathogens. In its earliest years, the program focused on vaccine development and treatment trials for typhus, meningitis, tuberculosis, *Salmonella*, schistosomiasis, *Brucella,* and other tropical diseases. Characterization of acute febrile illness and acute diarrheal illness remain core areas of investigation. The mission of BPDRP now encompasses multilateral training and research activities in bacteriology, clinical epidemiology, tropical medicine, ethics, molecular diagnostics, malaria and enteric parasites, and seroimmunology.

The program serves as a WHO reference center for malaria diagnostics, and established a training center for malarial microscopy and immunologic and molecular malaria diagnostics in 2011. BPDRP has also served as a WHO reference lab for Rotavirus testing since 2005, and has partnered with WHO/EMRO and CDC to establish CaliciNet (surveillance network for norovirus sequences) in the region. BPDRP works closely with public health officials in the region, serving as a reference lab upon request. In addition, BPDRP has partnered in laboratory capacity building initiatives in Afghanistan, Djibouti, and Iraq.

BPDRP maintains active clinical trials and epidemiological studies on diarrheal disease, respiratory disease, and self-reported illness at US military field sites. BPDRP frequently responds to infectious disease outbreaks in deployed US military populations, to include recent malaria outbreaks in Liberia and Uganda, and a major acute diarrheal infection outbreak in Qatar.

Viral and Zoonotic Disease Research Program (VZDRP)

"To describe the epidemiology of viral pathogens and to genetically and antigenically characterize virus isolates and evaluate vaccines and diagnostic assays."

VZDRP continues to be the regional leader for influenza surveillance. Active seasonal influenza surveillance programs have been established in eleven nations. The primary purpose of this surveillance is the timely identification and reporting of circulating influenza viruses to the CDC vaccine developers, to ensure effective vaccination for a regional population of almost 600 million.

VZDRP supports avian influenza outbreak response in the region as a WHO EMRO Regional Influenza Reference Laboratory, and can deploy state-of-the-art diagnostic capacity to most nations within the region in under 24 hours. Over the past year, VZDRP has responded to several outbreaks including Dengue and Chikungunya in Yemen, Adenovirus in Jordan, and measles and mumps in Egypt. In addition, VZDRP conducts acute febrile illness surveillance studies in East Europe and West Africa. The program has various modules used to train investigators from Eastern Mediterranean countries, Central Asia and Eastern Europe. These modules include molecular and serologic diagnoses of viral etiologies, tissue culture, sequencing, functional markers for anti-viral drug resistance, biosafety and biohazard training, Good Lab Practices, and data entry/analysis.

Global Disease Detection & Response Program (GDDRP)

"To identify, characterize and evaluate risk factors for the most important infectious disease threats and strengthen infectious disease surveillance and response networks in the region."

The CDC's Global Disease Detection (GDD) Regional Center in Egypt was established in partnership with NAMRU-3 in 2006. The GDD Regional Center is coordinated by the Global Disease Detection and Response Program, as one of NAMRU-3's five scientific programs. This collaboration has strengthened the infectious disease surveillance and response networks in the region, through establishment of sentinel surveillance sites, promotion of disease prevention and control programs, and enhancement of host-nation infectious disease diagnostic capability within the Middle Eastern region.

Key accomplishments of GDDRP include collaboration with WHO in the development of the regional Eastern Mediterranean Acute Respiratory Infection Surveillance network, establishment of effective infection control programs in Egypt and Jordan, training of 42 global health leaders from 5 countries through the CDC Field Epidemiology Training Program in Egypt, and development of population based infectious disease surveillance in Damanhour, Egypt, through the International Emerging Infections Program (IEIP).

Vector Biology Research Program (VBRP)

"The mission of the VBRP is to identify arthropod vectors, detect vector-borne disease threats of military and public health importance, assess its risk in the region and evaluate vector control measures".

NAMRU-3 was created by the U.S. military in a response to typhus outbreak (vectored by the body louse), giving birth to the Medical Zoology Department. In 1999, the Medical Zoology Department was renamed VBRP. VBRP has been instrumental in conducting mosquito, tick, and sand fly surveillance in several countries across Africa and Asia including Liberia, Ghana, Morocco, Libya, Egypt, Sudan, Djibouti, Yemen, Afghanistan and Pakistan. Proper identification of disease-causing vectors is of paramount importance in any surveillance program. Identification of vector species and detection of their associated pathogens (*Leishmania, Plasmodium,* and arboviruses) is conducted by highly qualified and certified technicians. VBRP has been influential in establishing and sustaining colonies of medically important vectors and their associated parasites.

VBRP has collaborated with GDDRP in the collection of ticks for detection of Crimean-Congo hemorrhagic fever in Ghana, Djibouti and Egypt. VBRP provides technical assistance regarding vector surveillance, monitoring, and control to deployed military forces in the Horn of Africa, the Multinational Force and Observers (MFO) based in Sinai, and Operation Onward Liberty in Liberia. VBRP is the WHO reference center for insecticide resistance monitoring in the EMRO region.

NAMRU-3 Ghana Detachment

"To establish a partnership between the U.S. Navy and Ghana for laboratory- and field-based infectious disease research and to perform clinical and field trials of new drug and vaccine strategies against malaria"

Productive research collaboration between NAMRU-3, the Ghana Ministry of Health, and the Noguchi Memorial Institute of Medical Research began in 1995 and was formalized with the establishment of a NAMRU-3 detachment with an assigned, full-time U.S. Naval medical research officer. Accomplishments have included completion of a phase I malaria blood stage vaccine (EBA-175), completion of a pivotal FDA placebo-controlled double-blinded dose ranging trial for the drug tafenoquine, epidemiological investigation establishing etiologies of newly identified cutaneous leishmaniasis and publication of the first report of *L. major* in Ghana, and establishment of a West African military collaboration for surveillance of influenza, sexually transmitted infections, and acute febrile illnesses. Upcoming efforts in Ghana include collaborations with GEIS in executing malaria resistance and immunological research, and developing arboviral research in collaboration with the Ghanaian Health Service.

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